

ATGAGAACATTAAAAACCTCATAACTGTTGTGGCCTTTAGTATTTTTTGGGTACTGTTGATTTACGTCAAT	72
GTTTATCTCTTTGGTGCTAAAGGAAGCTTGTCAATTTATGGCTTTTGTCTGATAGCTTACCTATTAGTCAAA	144
ATGTCCTTATCCTTTTTTACAAGCCATTTAAGGGAAGGGCTGGGCAATATAAGGTTGCAGCCATTATTCCC	216
TCTTATAACGAAGATGCTGAGTCATTGCTAGAGACCTTAAAAAGTGTTGAGCAGCAAACCTATCCCCTAGCA	288
GAAATTTATGTTGTTGACGATGGAAGTGCTGATGAGACAGGTATTAAGCGCATTGAAGACTATGTGCGTGAC	360
ACTGGTGACCTATCAAGCAATGTCATTGTTTCATCGGTGAGAGAAAAATCAAGGAAAGCGTCATGCACAGGCC	432
TGGGCCTTTGAAAGATCAGACGCTGATGTCTTTTTGACCGTTGACTCAGATACTTATATCTACCCTGATGCT	504
TTAGAGGAGTTGTTAAAAACCTTTAATGACCCAACTGTTTTTGCTGCGACGGGTACCTTAATGTCAGAAAT	576
AGACAAACCAATCTCTTAACACGCTTGACAGATATTCGCTATGATAATGCTTTTGGCGTTGAACGAGCTGCC	648
CAATCCGTTACAGGTAATATCCTTGTTTGCTCAGGTCCGCTTAGCGTTTACAGACGCGAGGTGGTTGTTTCCT	720
AACATAGATAGATACATCAACCAGACCTTCCTGGGTATTCTGTAAAGTATTGGTGATGACAGGTGCTTGACC	792
AACTATGCAACTGATTTAGGAAAGACTGTTTATCAATCCACTGCTAAATGTATTACAGATGTTCTTGACAAG	864
ATGTCTACTTACTTGAAGCAGCAAAACCGCTGGAACAAGTCCTTCTTTAGAGAGTCCATTATTTCTGTAAAG	936
AAAATCATGAACAATCCTTTTGTAGCCCTATGGACCATACTTGAGGTGTCTATGTTTATGATGCTTGTTTAT	1008
TCTGTGGTGGATTTCTTTGTAGGCAATGTCAGAGAATTTGATTGGCTCAGGGTTTTAGCCTTTCTGGTGATT	1080
ATCTTCATTGTTGCCCTGTGTCGGAACATTATTACATGCTTAAGCACCCGCTGTCCTTCTGTTATCTCCG	1152
TTTTATGGGGTGCTGCATTTGTTTGTCTACAGCCCTTGAAATTATATTCTCTTTTTACTATTAGAAATGCT	1224
GACTGGGGAACACGTAAAAAATTATTATAA	1254

M R T L K N	L I T V V A F S I F W V L L I Y V	N	24
V Y L F G A K G S L S	I Y G F L L I A Y L L V	K	48
<del>M S L S F F Y K</del>	P F K G R A G Q Y K V A A I I P		72
S Y N E D A E S L L E T L K S V Q Q Q T Y P L A			96
E I Y V V D D G S A D E T G I K R I E D Y V R D			120
T G D L S S N V I V H R S E K N Q G K R H A Q A			144
W A F E R S D A D V F L T V D S D T Y I Y P D A			168
L E E L L K T F N D P T V F A A T G H L N V R N			192
R Q T N L L T R L T D I R Y D N A F G V E R A A			216
Q S V T G N I L V C S G P L S V Y R R E V V V P			240
N I D R Y I N Q T F L G I P V S I G D D R C L T			264
N Y A T D L G	<del>K T V Y O S T A K</del>	C I T D V P D K	288
M S T Y L K Q Q N R W N K S F F R E S I I S V K			312
K I M N N P F	V A L W T I L E V S M F M M L V Y		336
<u>S V V</u> D F F V G N V R E F D	<u>W L R V L A F L V I</u>		360
<u>I F I V A L C</u> R N I H Y M L K H P L S	<u>F L L S P</u>		384
<u>F Y G V L H L F V L Q P L</u>	<del>K L Y S L F T I R</del>	N A	408
D W G T R K K L L *			417

SEQUENCE ID NO. 3

5'-GCTGATGAGACAGGTATTAAGC

primer: se1 (sense, nucleotides G<sup>316</sup> - C<sup>337</sup>)

SEQUENCE ID NO. 4

5'-ATCAAATTCTCTGACATTGC

primer: se2 (antisense, for sense nucleotides G<sup>1031</sup> - T<sup>1050</sup>)

SEQUENCE ID NO. 5

5'-GACTCAGATACTTATATCTA

primer: sesp1 (sense, for nucleotides G<sup>475</sup> - A<sup>494</sup>)

SEQUENCE ID NO. 6

5'-TTTTTACGTGTTCCCCA

primer: sesp2 (antisense, for sense nucleotides T<sup>1228</sup> - A<sup>1244</sup>)

00469007 00269460

Protein sequence of A98R, the PBCV-1 HA synthase

1 MGKNIIIMVS WYTIITSNLI AVGGASLILA PAITGYVLHW NIALSTIWGV SAYGIFVFGF  
61 FLAQVLFSEL NRKRLRKWIS LRPKGWNDVR LAVIIAGYRE DPYMFQKCLE SVRDSYGNV  
121 ARLICVIDGD EDDDMRMAAV YKAIYNDNIK KPEFVLCESD DKEGERIDSD FSRDICVLQP  
181 HRGKRECLYT GFQLAKMDPS VNAVVLIDSD TVLEKDAILE VVYPLACDPE IQAVAGECKI  
241 WNTDTLLSLL VAWRYSAFC VERSAQSFRR TVQCVGGPLG AYKDIIKEIK DPWISQRFLG  
301 QKCTYGDDRR LTNEILMRGK KVFVTPFAVG WSDSPTNVFR YIVQQTRWSK SWCREIWYTL  
361 FAAWKHGLSG IWLAFECYQ IYFFFLVIYL FSRLAVEADP RAQTATVIVS TTVALIKCGY  
421 FSFRAKDIRA FYFVLYTFVY FFCMIPARIT AMMTLWDIGW DTRGGNEKPS VGTRVALWAK  
481 QYLIAYMWWA AVVGAGVYSI VHNWMFDWNS LSYRFALVGI CSYIVFIVIV LVVYFTGKIT  
541 TWNFTKLQKE LIEDRVLYDA TTNAQSV

567

# Nucleotide Sequence of A98R gene in the PBCV-1 Virus Genome

Start: ATG 50901 Stop: TGA 52607

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50881 aagacttctt gaaagttaca ATGggtaaaa atataatcat aatggtttcg tggtagacca
50941 tcataacttc aaatctaata gcggttgagg gagcctctct aatcttggct ccggcaatta
51001 ctgggtatgt tctacattgg aatattgtct tctcgacaat ctggggagta tcagcttatg
51061 gtattttcgt ttttgggttt ttccttgcac aagttttatt ttcagaactg aacaggaaac
51121 gtcttcgcaa gtggatttct ctcagacctt agggttggaa tgatgttcgt ttggctgtga
51181 tcattgctgg atatcgcgag gatccttata tgttccagaa gtgcctcgag tctgtacgtg
51241 actctgatta tggcaacggt gcccgctctga tttgtgtgat tgacggtgat gaggacgatg
51301 atatgaggat ggctgccgtt tacaaggcga tctacaatga taatatcaag aagcccagat
51361 ttgttctgtg tgagttagac gacaaggaag gtgaacgcac cgactctgat ttctctcgcg
51421 acatttctgt cctccagcct catcgtggaa aacgggagtg tctttatact gggtttcaac
51481 ttgcaaagat ggaccccagt gtcaatgctg tcgttctgat tgacagcgat accgttctcg
51541 agaaggatgc tattctggaa gttgtatacc cacttgcacg cgatcccag atccaagccg
51601 ttgcaggatga gtgtaagatt tggaacacag acactctttt gactcttctc gtcgcttggc
51661 ggtactattc tgcgttttgt gtggagagga gtgccagtc ttttttcagg actgttcagt
51721 gcgttggggg gccactgggt gcctacaaga ttgatatcat taaggagatt aaggaccctt
51781 ggatttccca gcgctttctt ggtcagaagt gtacttacgg tgacgaccgc cggctaacca
51841 acgagatctt gatgcgtggt aaaaagggtt tgttactcc atttgctggt ggttggtctg
51901 acagtcggac caatgtgttt cggtagatcg ttcagcagac ccgctggagt aagtcgtggt
51961 gccgcgaaat ttggtacacc ctcttcgccc cgtggaagca cgttttgtct ggaatttggc
52021 tggcctttga atgtttgtat caaattacat acttcttcct cgtgatttac ctcttttctc
52081 gcctagccgt tgaggccgac cctcgcgccc agacagccac ggtgattgtg agcaccacgg
52141 ttgcattgat taagtgtggg tatttttcat tccgagccaa ggatattcgg gcgttttact
52201 ttgtgcttta tacatttgtt tacttttctt gtatgattcc ggcaggatt actgcaatga
52261 tgacgctttg ggacattggc tgggatactc gcggtggaaa cgagaagcct tccgttggca
52321 cccgggtcgc tctgtgggca aagcaatata tcattgcata tatgtggtgg gccgcggttg
52381 ttggcgctgg agtttacagc atcgtccata actggatggt cgattggaat tctctttctt
52441 atcgttttgc tttggttggg atttgttctt acattgtttt tattgttatt gtgctggtgg
52501 tttatttcac cggcaaaatt acgacttggg atttcacgaa gcttcagaag gagctaatac
52561 aggatcgcgt tctgtacgat gcaactacca atgctcagtc tgtGTGAttt ttctgcaag

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50901-52607

# Nucleotide and Protein Sequence of *Pasteurella multocida*

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1           M N T L S Q A I K A Y N S N D Y Q
-18  ATTTTTTAAGGACAGAAAATGAATACATTATCACAAGCAATAAAAGCATATAACAGCAATGACTATCAA

18  L A L K L F E K S A E I Y G R K I V E F Q I T
52  TTAGCACTCAAATTATTTGAAAAGTCGGCGGAAATCTATGGACGGAAAATTGTTGAATTTCAAATTACC

41  K C Q E K L S A H P S V N S A H L S V N K E E
121 AAATGCCAAGAAAACCTCTCAGCACATCCTTCTGTTAATTCAGCACATCTTTCTGATAATAAGAAGAA

64  K V N V C D S P L D I A T Q L L L S N V K K L
190 AAAGTCAATGTTTGCATAGTCCGTTAGATATTGCAACACAACCTGTTACTTTCCAACGTAAAAAATTA

87  V L S D S E K N T L K N K W K L L T E K K S E
259 GTACTTTCTGACTCGGAAAAAACACGTTAAAAAATAAATGGAAATTGCTCACTGAGAAGAAATCTGAA

110 N A E V R A V A L V P K D F P K D L V L A P L
328 AATGCGGAGGTAAGAGCGGTCGCCCTGTACCAAAAGATTTTCCCAAAGATCTGGTTTTAGCGCCTTTA

133 P D H V N D F T W Y K K R K K R L G I K P E H
397 CCTGATCATGTTAATGATTTTACATGGTACAAAAAGCGAAAGAAAGACTTGGCATAAACCTGAACAT

156 Q H V G L S I I V T T F N R P A I L S I T L A
466 CAACATGTTGGTCTTTCTATTATCGTTACAACATTCAATCGACCAGCAATTTTATCGATTACATTAGCC

179 C L V N Q K T H Y P F E V I V T D D G S Q E D
535 TGTTTAGTAAACCAAAAAACACATTACCCGTTTGAAGTTATCGTGACAGATGATGGTAGTCAGGAAGAT

202 L S P I I R Q Y E N K L D I R Y V R Q K D N G
604 CTATCACCGATCATTCGCCAATATGAAAATAAATTGGATATTCGCTACGTCAGACAAAAAGATAACGGT

225 F Q A S A A R N M G L R L A K Y D F I G L L D
673 TTTCAAGCCAGTCCGCTCGGAATATGGGATTACGCTTAGCAAATATGACTTTATTGGCTTACTCGAC

248 C D M A P N P L W V H S Y V A E L L E D D D L
742 TGTGATATGGCGCCAAATCCATTATGGGTTCATTCTTATGTTGCAGAGCTATTAGAAGATGATGATTTA

271 T I I G P R K Y I D T Q H I D P K D F L N N A
811 ACAATCATTGGTCCAAGAAAATACATCGATACACAACATATTGACCCAAAAGACTTCTTAAATAACGCG

294 S L L E S L P E V K T N N S V A A K G E G T V
880 AGTTTGCTTGAATCATTACCAGAAGTGAAAACCAATAATAGTGTTGCCGCAAAGGGGAAGGAACAGTT

317 S L D W R L E Q F E K T E N L R L S D S P F R
949 TCTCTGGATTGGCGCTTAGAACAAATTCGAAAAAACAGAAAATCTCCGCTTATCCGATTGCGCTTTCCGT

340 F F A A G N V A F A K K W L N K S G F F D E E
1018 TTTTTTGCGGCGGTAATGTTGCTTTCGCTAAAAAATGGCTAAATAAATCCGGTTTCTTTGATGAGGAA

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363	F N H W G G E D V E F G Y R L F R Y G S F F K
1087	TTTAATCACTGGGGTGGAGAAGATGTGGAATTTGGATATCGCTTATTCCGTTACGGTAGTTTCTTTAA
386	T I D G I M A Y H Q E P P G K E N E T D R E A
1156	ACTATTGATGGCATTATGGCCTACCATCAAGAGCCACCAGGTAAAGAAAATGAAACCGATCGTGAAGCG
409	G K N I T L D I M R E K V P Y I Y R K L L P I
1225	GGAAAAATATTACGCTCGATATTATGAGAGAAAAGGTCCCTTATATCTATAGAAAACCTTTTACCAATA
432	E D S H I N R V P L V S I Y I P A Y N C A N Y
1294	GAAGATTCGCATATCAATAGAGTACCTTTAGTTTCAATTTATATCCCAGCTTATAACTGTGCAAACCTAT
455	I Q R C V D S A L N Q T V V D L E V C I C N D
1363	ATTCAACGTTGCGTAGATAGTGCCTGAATCAGACTGTTGTTGATCTCGAGGTTTGTATTTGTAACGAT
478	G S T D N T L E V I N K L Y G N N P R V R I M
1432	GGTTCAACAGATAATACCTTAGAAGTGATCAATAAGCTTTATGGTAATAATCCTAGGTTACGCATCATG
501	S K P N G G I A S A S N A A V S F A K G Y Y I
1501	TCTAAACCAAATGGCGGAATAGCCTCAGCATCAAATGCAGCCGTTTCTTTTGCTAAAGGTTATTACATT
524	G Q L D S D D Y L E P D A V E L C L K E F L K
1570	GGGCAGTTAGATTGAGATGATTATCTTGAGCCTGATGCAGTTGAACTGTGTTTAAAAAGAATTTTTTAAAA
547	D K T L A C V Y T T N R N V N P D G S L I A N
1639	GATAAAACGCTAGCTTGTGTTTATACCACTAATAGAAACGTCAATCCGGATGGTAGCTTAATCGCTAAT
570	G Y N W P E F S R E K L T T A M I A H H F R M
1708	GGTTACAATTGGCCAGAATTTTCACGAGAAAACTCACAACGGCTATGATTGCTCACCACCTTTAGAATG
593	F T I R A W H L T D G F N E K I E N A V D Y D
1777	TTCACGATTAGAGCTTGGCATTTAACCTGATGGATTCAATGAAAAAATTGAAAAATGCCGTAGACTATGAC
616	M F L K L S E V G K F K H L N K I C Y N R V L
1846	ATGTTTCCTCAAACCTAGTGAAGTTGGAAAATTTAAACATCTTAATAAAATCTGCTATAACCGTGTATTA
639	H G D N T S I K K L G I Q K K N H F V V V N Q
1915	CATGGTGATAACACATCAATTAAGAACTTGGCATTCAAAGAAAAACCATTTTGTGTAGTCAATCAG
662	S L N R Q G I T Y Y N Y D E F D D L D E S R K
1984	TCATTAAATAGACAAGGCATAACTTATTATAATTATGACGAATTTGATGATTAGATGAAAGTAGAAAG
685	Y I F N K T A E Y Q E E I D I L K D I K I I Q
2053	TATATTTTCAATAAAAACCGCTGAATATCAAGAAGAGATTGATATCTTAAAAGATATTAAATCATCCAG
708	N K D A K I A V S I F Y P N T L N G L V K K L
2122	AATAAAGATGCCAAAATCGCAGTCAGTATTTTTTATCCCAATACATTAAACGGCTTAGTGAAAAAACTA
731	N N I I E Y N K N I F V I V L H V D K N H L T
2191	AACAATATTATTGAATATAATAAAAAATATATTCGTTATTGTTCTACATGTTGATAAGAATCATCTTACA
754	P D I K K E I L A F Y H K H Q V N I L L N N D
2260	CCAGATATCAAAAAAGAAATACTAGCCTTCTATCATAAACATCAAGTGAATATTTTACTAAATAATGAT

777 I S Y Y T S N R L I K T E A H L S N I N K L S  
 2329 ATCTCATATTACACGAGTAATAGATTAATAAAAACTGAGGCGCATTTAAGTAATATTAATAAATTAAGT  
  
 800 Q L N L N C E Y I I F D N H D S L F V K N D S  
 2398 CAGTTAAATCTAAATTGTGAATACATCATTTTTGATAATCATGACAGCCTATTCGTTAAAAATGACAGC  
  
 823 Y A Y M K K Y D V G M N F S A L T H D W I E K  
 2467 TATGCTTATATGAAAAATATGATGTCGGCATGAATTTCTCAGCATTAAACACATGATTGGATCGAGAAA  
  
 846 I N A H P P F K K L I K T Y F N D N D L K S M  
 2536 ATCAATGCGCATCCACCATTTAAAAAGCTCATTAAAACCTATTTTAATGACAATGACTTAAAAAGTATG  
  
 869 N V K G A S Q G M F M T Y A L A H E L L T I I  
 2605 AATGTGAAAGGGGCATCACAAGGTATGTTTATGACGTATGCGCTAGCGCATGAGCTTCTGACGATTATT  
  
 892 K E V I T S C Q S I D S V P E Y N T E D I W F  
 2674 AAAGAAGTCATCACATCTTGCCAGTCAATTGATAGTGTGCCAGAATATAAACTGAGGATATTTGGTTC  
  
 915 Q F A L L I L E K K T G H V F N K T S T L T Y  
 2743 CAATTTGCACTTTTAATCTTAGAAAAGAAAACCGGCCATGTATTTAATAAAACATCGACCCTGACTTAT  
  
 938 M P W E R K L Q W T N E Q I E S A K R G E N I  
 2812 ATGCCTTGGAACGAAAATTACAATGGACAAATGAACAAATTGAAAGTGCAAAAAGAGGAGAAAATATA  
  
 961 P V N K F I I N S I T L \*  
 2881 CCTGTAAACAAGTTCATTATTAATAGTATAACTCTATAA